

I claim:

1. A uni-directional fluid valve comprising a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice; the cantilevered flexible flap having a planform defining a root end and a free end at opposite ends of a longitudinal axis of the flap, and two peripheral side edges respectively extending between the root end and the free end; the valve seat having sealing surfaces that contact the flap along said root end, free end and peripheral side edges when the fluid valve is closed; the cantilevered flexible flap is [attached to] mounted between the respective sealing surface of the valve seat at said root end and is freely movable to flex away from the respective sealing surfaces of the valve seat at said free end and along at least portions of said peripheral side edges when fluid flows through the fluid valve and the fluid valve is open; and said root end of the cantilevered flexible flap and the respective sealing surface that contacts the cantilevered flexible flap at said root end have a fixed curvature in a direction transverse to said longitudinal axis, said transverse curvature biases the flap and maintains it substantially in contact with all said sealing surfaces of the valve seat in the absence of an opening pressure differential across the flap, in any orientation of the valve.

2. A valve according to claim 1 wherein the cantilevered flexible flap exhibits said curvature in its natural state.

3. A valve according to claim 1 wherein said curvature is imparted to the cantilevered flexible flap by virtue of its mounting on the valve seat.

4. A valve according to claim 3 wherein the cantilevered flexible flap is trapped at said root end between confronting respectively concave and convex surfaces of first and second structural members, said concave surface comprising a said sealing surface of said valve seat.

5. A valve according to claim 4 wherein said second structural member presents a further surface in contact with a central portion of the cantilevered flexible flap adjacent to said root end to accentuate the curvature thereof.

6. A valve according to claim 1 wherein the respective said sealing surface of the valve seat which the free end of the cantilevered flexible flap contacts is substantially flat.

7. A valve according to claim 1 wherein the respective said sealing surface of the valve seat which the free end of the cantilevered flexible flap contacts is of concave curvature.

8. A valve according to claim 1 wherein the respective said sealing surfaces of the valve seat which the peripheral side edges of the cantilevered flexible flap contact are substantially flat.

9. A valve according to claim 1 wherein the mounting of the cantilevered flexible flap in the valve seat imparts a longitudinal curvature to the central section of the cantilevered flexible flap.

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10. A filter mask having an exhalation valve comprising a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice; the cantilevered flexible flap having a planform defining a root end and a free end at opposite ends of a longitudinal axis of the cantilevered flexible flap, and two peripheral side edges respectively extending between the root end and the free end; the valve seat having sealing surfaces that contact the cantilevered flexible flap along said root end, free end and peripheral side edges when the exhalation valve is closed; the cantilevered flexible flap is [attached to] mounted between the respective sealing surface of the valve seat at said root end and is freely movable to flex away from the respective sealing surfaces of the valve seat at said free end and along at least portions of said peripheral side edges when a user of the filter mask exhales and causes

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the exhalation valve to open: and said root end of the cantilevered flexible flap and the respective sealing surface that contacts the cantilevered flexible flap at said root end have a fixed curvature in a direction transverse to said longitudinal axis, said transverse curvature biases the flap and maintains it substantially in contact with all said sealing surfaces of the valve seat in the absence of an exhalatory pressure differential across the flap, in any orientation of the valve.

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12. A uni-directional fluid valve comprising:  
a cantilevered flexible flap and a cooperating valve  
seat surrounding a valve orifice;

5 the cantilevered flexible flap having a planform  
defining a root end and a free end at opposite ends of a  
longitudinal axis of the flap;

the valve seat having sealing surfaces that contact the  
flap at said root end and the free end when the fluid valve is  
closed;

10 the cantilevered flexible flap being mounted between  
the respective sealing surface of the valve seat at said root  
end and being freely movable to flex away from the  
respective sealing surface of the valve seat at said free end  
when fluid flows through the fluid valve and the fluid valve  
is open; and

15 said root end of the cantilevered flexible flap and the  
respective sealing surface that contacts the cantilevered  
flexible flap at said root end having a transverse  
configuration extending in a direction transverse to said  
longitudinal axis, said transverse configuration resulting in  
maintaining the flap substantially in contact with said  
sealing surfaces of the valve seat in the absence of an  
opening pressure differential across the flap, in any  
orientation of the valve.

25 13. A uni-directional fluid valve comprising:  
a cantilevered flexible flap and a cooperating valve  
seat surrounding a valve orifice;

30 the cantilevered flexible flap having a planform  
defining a root end and a free end at opposite ends of a  
longitudinal axis of the flap, and two peripheral side edges  
respectively extending between the root end and the free  
end;

35 the valve seat having sealing surfaces that contact the  
flap at said root end, said free end, and said peripheral side  
edges when the fluid valve is closed;

40 the cantilevered flexible flap being mounted between  
the respective sealing surface of the valve seat at said root  
end and being freely movable to flex away from the  
respective sealing surface of the valve seat at said free end  
and along at least portions of said peripheral side edges  
when fluid flows through the fluid valve and the fluid valve  
is open; and

45 said root end of the cantilevered flexible flap and the  
respective sealing surface that contacts the cantilevered  
flexible flap at said root end having a transverse  
configuration extending in a direction transverse to said  
longitudinal axis, said transverse configuration resulting in  
maintaining the flap substantially in contact with said  
sealing surfaces of the valve seat in the absence of an  
opening pressure differential across the flap, in any  
orientation of the valve.

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14. A filter mask having an exhalation valve comprising:

a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice;

the cantilevered flexible flap having a planform defining a root end and a free end at opposite ends of a longitudinal axis of the cantilevered flexible flap;

the valve seat having sealing surfaces that contact the cantilevered flexible flap along said root end and said free end when the exhalation valve is closed;

the cantilevered flexible flap being mounted between the respective sealing surface of the valve seat at said root end and being freely movable to flex away from the respective sealing surface of the valve seat at said free end when a user of the filter mask exhales and causes the exhalation valve to open and wherein said root end of the cantilevered flexible flap and the respective sealing surface that contacts the cantilevered flexible flap at said root end have a transverse configuration extending in a direction transverse to said longitudinal axis so that the flap is substantially maintained in contact with all of said sealing surfaces of the valve seat in the absence of an exhalatory pressure differential across the flap, in any orientation of the valve.

15. A filter mask having an exhalation valve comprising:

a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice;

the cantilevered flexible flap having a planform defining a root end and a free end at opposite ends of a longitudinal axis of the cantilevered flexible flap, and two peripheral side edges respectively extending between the root end and the free end;

the valve seat having sealing surfaces that contact the cantilevered flexible flap along said root end, free end and peripheral side edges when the exhalation valve is closed;

the cantilevered flexible flap being mounted between the respective sealing surface of the valve seat at said root end and being freely movable to flex away from the respective sealing surfaces of the valve seat at said free end and along at least portions of said peripheral side edges when a user of the filter mask exhales and causes the exhalation valve to open and wherein said root end of the cantilevered flexible flap and the respective sealing surface that contacts the cantilevered flexible flap at said root end have a transverse configuration extending in a direction transverse to said longitudinal axis so that the flap is substantially maintained in contact with all of said sealing surfaces of the valve seat in the absence of an exhalatory pressure differential across the flap, in any orientation of the valve.

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